end-diastolic LV diameter ($r = -0.677$, $P = 0.0041$), to end-diastolic LV volume ($r = -0.629$, $P = 0.0076$) and to end-systolic LV volume ($r = -0.616$, $P = 0.0090$) in healthy children.
*Conclusion.*— Speckle tracking is a promising technology to assess myocardial strain. However, feasibility and reproducibility of new systolic parameters such as twist are low. Conversely, TMAD using speckle-tracking technology seems an easy measurable marker with an excellent feasibility and reproducibility to assess the mitral annular displacement. It seems independent of body surface area and well correlated with stroke volume. The advantage of TMAD over tissue Doppler imaging relies on the peculiarities of speckle tracking technology. Speckle tracking is angle independent and thereby permits the measurement of strain vectors that are not parallel to the ultrasound beam. TMAD is an interesting tool in children. Its accuracy to estimate systolic function needs to be further investigated in children.

http://dx.doi.org/10.1016/j.acvd.2013.03.049

46

## Identification of major coronary artery anomalies in a pediatric and adult population: A prospective echocardiographic study

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*Objectives.*— We sought to describe our experiment with major coronary anomalies (MCA) diagnosed in trans thoracic echocardiographic (TTE) in a large adult and pediatric population.
*Background.*— MCA may have serious clinical consequences. No echocardiographic study has identified prospectively all potentially serious coronary anomalies in a general adult and pediatric population.
*Patients.*— From June 2008 to January 2012, a systematic search for major coronary anomalies was conducted in children and adults patients, coming for a TTE.
*Results.*— Three thousand five hundred and two patients (84% adults and 16% children) received a TTE. Fourteen coronary anomalies (0.39%) were diagnosed: nine anomalous origins of coronary artery from the opposite sinus with inter arterial course, one abnormal left coronary artery from pulmonary artery, three single coronary arteries, one coronary fistula. Cardiac symptoms initiated investigation in seven patients. Five patients underwent specific surgery: two coronary reimplantations, three coronary bypass grafting. Ten patients had already received at least one TTE without the anomalous coronary artery being either diagnosed or suspected.
*Conclusions.*— MCA is a rare condition which can be identified through an accurate exploration of coronary anatomy by TTE. The search for potentially lethal congenital coronary anomalies should be included a standard echocardiographic examination.

http://dx.doi.org/10.1016/j.acvd.2013.03.050

47

## Bicuspid aortic valve — the importance of monitoring children

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Bicuspid aortic valve is a common congenital heart defect.
*Aim.*— Point out the importance of bicuspid aortic valve in children, and the importance of monitoring these children.
*Patients.*— We examined by echocardiography 1830 children: 2 months of age to 18 years old —978 (53.44%) boys and 852 (46.56%) girls for heart murmur or symptoms of the cardiovascular system. Study was carried out using Siemens Sonoline G50. Measurements are performed in 2D and M-mode. Echocardiographic diagnosis of these defects is based on the existence of two aortic cusps, instead of normal three, often asymmetrical, with one line of coaptation consisting of both commissure.
*Results.*— Among the children examined, 15 (0.82%) children were with bicuspid aortic valve, 11 (1.12%) boys and four (0.47%) girls. Frequency was higher in boys.
There were two boys with bicuspid aortic valve, one with aortic stenosis, two with aortic insufficiency, six children (five boys and one girl) with aortic stenosis and regurgitation. Four children (one boy and three girls) had aortic coarctation.
Monitoring the children in 4-year period, three children deteriorated aortic stenosis. In one boy there was no aortic regurgitation, but after a year, it appeared. Enlarged area of the sinus Valsalva was registered in one boy.
*Conclusion.*— It is important to monitor children with bicuspid aortic valves, because these children are at increased risk of complications including aortic valvular disease, ascending aorta aneurysm and aortic dissection. Patients with bicuspid aortic valve are also at higher risk of aortic coarctation.

http://dx.doi.org/10.1016/j.acvd.2013.03.051

48

## What about adult congenital heart disease in our country in 2013? Results from an observational study from an Algerian cardiology department

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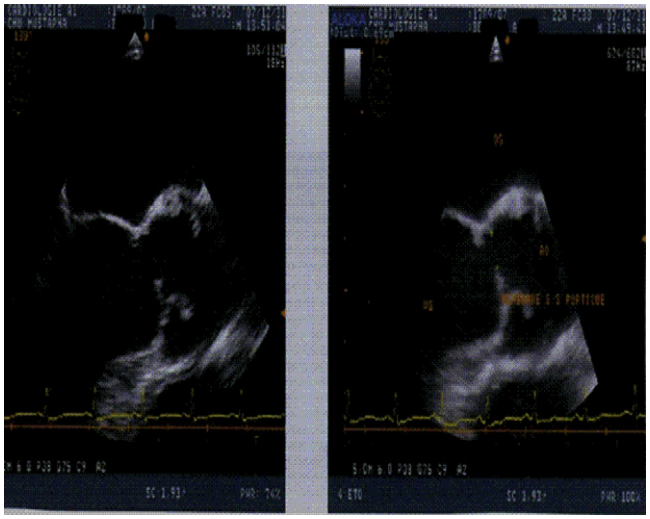
*Objectives.*— To analyse adult congenital heart disease (ACHD) regarding gender.
*Patients and methods.*— One hundred and thirty-four patients(pts), 63 men, mean age $32.62 \pm 12.85$ yrs, 18—74 yrs underwent TTE and TEE.
Results:
— atrial septal defects (ASD): 48 pts 31 women (W), 17 men (M) sex ratio 1.82; type secundum ASD except one type sinus venosus ASD and one coronary sinus ASD — ventricular septal defect (VSD): eight (7W, 1M) with aortic insufficiency Laubry-Pezzi. 1W with Eisenmenger's syndrome;
— atrio-ventricular septal defect (AVSD): eight pts (5W, 3M) with severe cleft regurgitation;
— patent ductus arteriosus (PDA): three pts (2W, 1M);
— coarctation of the aorta: two (1W); one pt with membranous subaortic stenosis;
— left ventricular outflow tract obstruction (LVOTO): six aortic stenosis with bicuspid valves (3W and 3M); six sub-aortic stenosis (5M and 1W all with a membranous form); 1M with supra-valvular stenosis named Williams and Beuren syndrome;
— mitral regurgitation: two pts (1W, 1M);
— right ventricular outflow tract obstruction with 15 valvular stenosis (pulmonary stenosis) 8W and 7M;
— tetralogy of Fallot: 15 (9W, 6M) of them, one with post-operative cardiac device-related infective endocarditic (CDRIE);
— double outlet RV: 1M;
— transposition of the great arteries: 3M with congenitally corrected transposition of the great arteries;
— Ebstein's Anomaly: 3M;
— Marfan syndrome: 10 pts (8M) one died after surgery;
— man with univentricular heart, one with Tricuspide atresia with Fontan operation, one W with uniauricular heart.
*Conclusion.*— Majority of patients survive with morbidities. Thath's new challenges with regard to cardiac imaging (Fig. 1).



http://dx.doi.org/10.1016/j.acvd.2013.03.052

## Session n° 8 — Miscellaneous

49

### Assessment of left ventricular recovery in Tako-Tsubo cardiomyopathy using 2D strain echocardiography

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*Background.*— Tako-Tsubo cardiomyopathy (TTC) is characterized by transient stress induced transient left ventricular (LV) dysfunction. This LV systolic dysfunction is characterized by a recovery. The aim of this study was to assess LV involvement in TTC by 2D speckle tracking echocardiography.
*Patients.*— We prospectively studied 40 patients (pts) presenting with typical pattern of TTC. All patients underwent three echocardiographic examinations: at admission, at day 5 and at one-month follow-up. The diagnosis of TTC was defined according to Mayo Clinic criteria. We used the automated function imaging (AFI) in apical 2-, 3- and 4-chamber views, allowing to calculate longitudinal global strain, strain of each left ventricular segment and the bull's-eye display. This AFI method non-invasively tracks and analyzes peak systolic strain based on 2D strain.
*Results.*— Mean age was 70 ± 10 y.o. (95% of women). Longitudinal global strain (LGS) was significantly depressed at admission as compared to LGS calculated at day 5 and at one-month follow-up (−6 ± 2% versus −10 ± 4% at day 5 versus −20 ± 3% at one-month follow-up, $P < 0.0001$). At admission, strain was particularly depressed in median and apical left ventricular segments and this dysfunction was circular (−2 ± 1% versus −10 ± 2% in basal segments). At day 5, partial recovery was observed, particularly in middle lateral and inferior walls, with an asymmetrical dysfunction. At 1-month follow-up, a complete recovery of LGS was observed in all left ventricular walls (−20 ± 3%).
*Conclusion.*— Our study suggests that left ventricular systolic dysfunction is circular and may be assessed by 2D strain. Recovery is asymmetrical and is complete at 1-month follow-up.

http://dx.doi.org/10.1016/j.acvd.2013.03.053

50

### Left ventricular function assessment by 3D-speckle tracking echocardiography in patients with light chains amyloidosis

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*Background and objective.*— Transthoracic echocardiography (TTE) is usually performed for patients with light chains amyloidosis (AL) when cardiac involvement is suspected. The latter is typically characterized by left ventricular (LV) diastolic dysfunction. However, the LV systolic ejection fraction (LVEF) is usually preserved.
Whether, the different components of the LV systolic contraction are altered in AL, is unknown.
The aim of this preliminary study was to assess the main components of the global LV systolic function, (longitudinal, circumferential, radial, area tracking and twist) using a 3D wall motion tracking imaging, a recent technique coupling a 3D volumetric acquisition with a wall motion tracking imaging in a serie of consecutive healthy controls and in patients with AL according to the Mayo Clinic staging.
*Methods and results.*— Twenty-nine consecutive subjects (six controls and 23 with AL and different degree of cardiac severity) were analysed. Classical 2DTTE parameters were obtained along with the 3D LV parameters: mean age was 66 ± 10 years, 55% were male. Compared to controls and to those with minimal/moderate (stage I/II) cardiac involvement, those with severe cardiac involvement (stage III) had significantly lower 3DLVEF, 3DLV global: longitudinal, circumferential, radial strain and lower area tracking (Table 1) (all $P < 0.05$). However, the 3D LV rotation and twist function were not different between the three groups. Traditional 2DTTE showed significant differences in diastolic function in stage III AL compared to those in stage I/II and controls; however, it was not able to detect significant differences in LV volumes and LVEF.
*Conclusion.*— Our preliminary study is the first to assess all components of LV contraction using simultaneous 3D full volume acquisition and wall motion tracking imaging in AL patients. Larger studies are needed to confirm these results and to assess their impact on outcome and management of AL patients.

**Table 1**

| Variables | Controls ($n = 6$) | Stage I/II ($n = 10$) | Stage III ($n = 13$) | *P* value |
|---|---|---|---|---|
| *Age* | 62 ± 9 | 65 ± 10 | 70 ± 10 | 0.03 |
| *Sex (% male)* | 48 | 48 | 67 | 0.25 |
| *2D LV echo parameters* | | | | |
| LVEDD (mm) | 45 ± 5 | 43 ± 6 | 43 ± 6 | 0.23 |
| LVESD (mm) | 28 ± 5 | 26 ± 5 | 30 ± 4 | 0.005 |
| LVEDV (mL) | 84 ± 24 | 74 ± 23 | 80 ± 25 | 0.2 |
| LVESV (mL) | 34 ± 12 | 31 ± 13 | 36 ± 15 | 0.3 |
| LVEF (%) | 62 ± 7 | 61 ± 7 | 57 ± 9 | 0.1 |
| **IVS (mm)** | **9 ± 1** | **13 ± 3** | **16 ± 3** | **< 0.0001** |
| **Lat E/E′** | **6 ± 0.7** | **11 ± 5** | **15 ± 8** | **0.002** |
| **E/A** | **0.9 ± 0.2** | **1.5 ± 1.5** | **1.9 ± 1.3** | **0.06** |
| Deceleration time | 199 ± 37 | 208 ± 46 | 194 ± 93 | 0.7 |
| **Left atrial volume index ($mL/m^2$)** | **18 ± 5** | **28 ± 9** | **39 ± 14** | **< 0.0001** |
| *3D LV echo parameters* | | | | |
| **LEVF (%)** | **47 ± 4** | **49 ± 6** | **35 ± 9** | **0.007** |
| EDV (mL) | 87 ± 13 | 84 ± 23 | 99 ± 23 | 0.3 |
| **ESV (mL)** | **46 ± 10** | **42 ± 12** | **67 ± 23** | **0.009** |
| **Global longitudinal strain (%)** | **−13 ± 3** | **−11 ± 2** | **−7.6 ± 2.8** | **0.001** |
| **Global circumferential strain (%)** | **−20 ± 2** | **−21 ± 4** | **−16 ± 5** | **0.04** |
| **Global radial strain (%)** | **+29 ± 18** | **+15 ± 9** | **+7 ± 5** | **0.001** |
| **Global area tracking (%)** | **−30 ± 3** | **−31 ± 5** | **−23 ± 6** | **0.004** |
| 3D twist (%) | 5 ± 3 | 4.5 ± 3 | 3.7 ± 2 | 0.5 |

http://dx.doi.org/10.1016/j.acvd.2013.03.054